

Cognitive Network and Service Operations

A transformative approach to elevate network or service operations to the most mature levels with continuous learning and optimization



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Introduction

The Network and Service Operations Centers in Service Providers and many enterprises still operate in reactive mode — diagnostics and troubleshooting only begins after a problem occurs on the network, a service is impacted or a customer calls. The technicians are inundated with information such as alarms, performance measures, network topology, network and service transactional data and more, but they lack an effective way to diagnose and resolve issues quickly; Mean Time To Repair (MTTR) is affected, impacting network and service availability, operational efficiency, and customer satisfaction.

For example, in a typical scenario, a technician will:

- Create a trouble ticket (if one is not automatically created)
- Access multiple systems and knowledge bases to diagnose the problem
- Identify the root cause
- Apply the right resolution or escalate the ticket to the next tier of support if unable to resolve the issue

The process is inefficient, tedious and lengthy.

Now, imagine if the technicians were supported by an advisor that can:

- Interact in natural language
- Notify them of problems that are going to occur before they impact customer service
- Provide an integrated 360-degree view of the problem being solved, with details of the alarms or predictive insights, performance measures, related historical trouble tickets, recent change requests on the component, and more
- Provide the recommended resolution with step-by-step instructions to solve the problem
- Integrate with an automation tool to automate the resolution

With the IBM solution for cognitive network operations center or cognitive service operations center, organizations can leverage cognitive computing to reduce operational costs, improve network and service availability, improve customer satisfaction, and reduce missed SLAs.

The technician would resolve the problem quickly and efficiently, and get it right the first time, reducing the MTTR, and improving operational efficiency and customer satisfaction.

IBM® has a solution for cognitive network and service operations that does just that, with capabilities and benefits that:

- Improve the maturity of the service provider's Network Operations Centers (NOCs) and can evolve them to Service Operations Centers (SOCs) focusing them on critical customer service issues and also empowering them to become proactive and preventive versus reactive
- Provide a knowledge base that supports searches based on semantics, not just key words, and understands natural language
- Support conversations in natural language for a more human advisor like experience. Quickly identifies the right resolution based on the various sources of structured and unstructured information the solution is trained on
- Continuously learns from the interactions and gets better over time and builds expertise in the domain
- Supports automated resolution of problems where applicable

Maturity levels of traditional operations

Progressing towards customer centric Service Quality Management, being proactive and preventing problems from occurring in the first place is a better strategy; mature NOCs are moving in this direction.

Traditional NOCs have a very network-centric focus for their operations—with the assumption that if the network is up, the services will also automatically be up and healthy, which is true to a certain extent.

Multiple System/Service Operators (MSOs) do need a healthy network and infrastructure over which to offer services. However, traditional network management tools aren't capable of identifying key symptoms of network degradation that first manifest themselves as service degradation and poor customer experience. Without a service- and customer-centric view, operators aren't able to fully understand the true quality of the service the customer is experiencing.

Traditional NOCs with low maturity levels typically operate in a constant reactive mode—trying to fix a problem quickly after its occurrence and impact to service. However, being proactive and preventing problems from occurring in the first place is a better strategy; mature NOCs are moving in this direction. Some of the more mature MSOs have evolved to implementing Service Quality

Management (SQM) and Customer Experience Management (CEM) analytical tools to take this further to a customer-centric service operations center operations. IBM experts believe cognitive computing is the next level of maturity that NOCs/SOCs need to achieve in order to operate in today's fast-paced and increasingly complex network and IT environment. With cognitive computing, NOCs/SOCs benefit from a solution that:

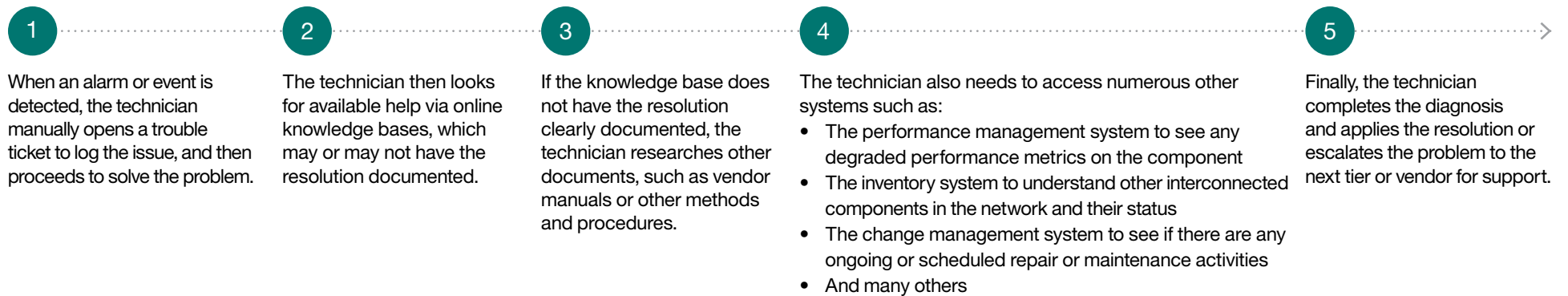
- 1 Is self-learning and continuously improving
- 2 Does not require new programs and extensive coding when new technologies and services are introduced, but rather a system that can be trained just as humans would be
- 3 Partners with humans to scale knowledge, provide consistent resolutions and recommendations and is always available

The challenges facing traditional operations

There are numerous challenges in traditional operations for both NOCs and SOCs:

- Lack of service quality and customer impact views
- Lack of automations
- Lack of integrated tools and dashboards
- Ineffective knowledge bases
- Most of all, technician churn leading to lack of experienced resources

Imagine the process a newly hired technician has to go through in a reactive environment when trying to solve an alarm or event that he or she has not encountered before:



In this reactive environment, an inordinate amount of the technician’s time is spent trying to diagnose the problem, which negatively impacts network and service availability and quality, as well as customer satisfaction.

Breaking away with cognitive computing and IBM Watson

The core of any cognitive system includes the following functionality:

Understand

Cognitive systems understand like humans do, whether that's through natural language or the written word, vocal or visual.

Reason

Cognitive systems reason by understanding underlying ideas and concepts to form hypotheses from which they infer and extract concepts.

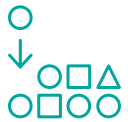
Learning

Cognitive systems learn and get more valuable with time. They advance with each new piece of information, interaction, and outcome to develop "expertise."

Interact

With abilities to see, talk and hear, cognitive systems interact with humans in a natural way

Cognitive computing solutions offer various capabilities, including the ability to:



Learn and build knowledge from various structured and unstructured sources of information



Understand natural language and interact more naturally with humans



Capture the expertise of top performers and accelerate the development of expertise in others



Enhance the cognitive processes of professionals to help improve decision making



Elevate the quality and consistency of decision making across an organization

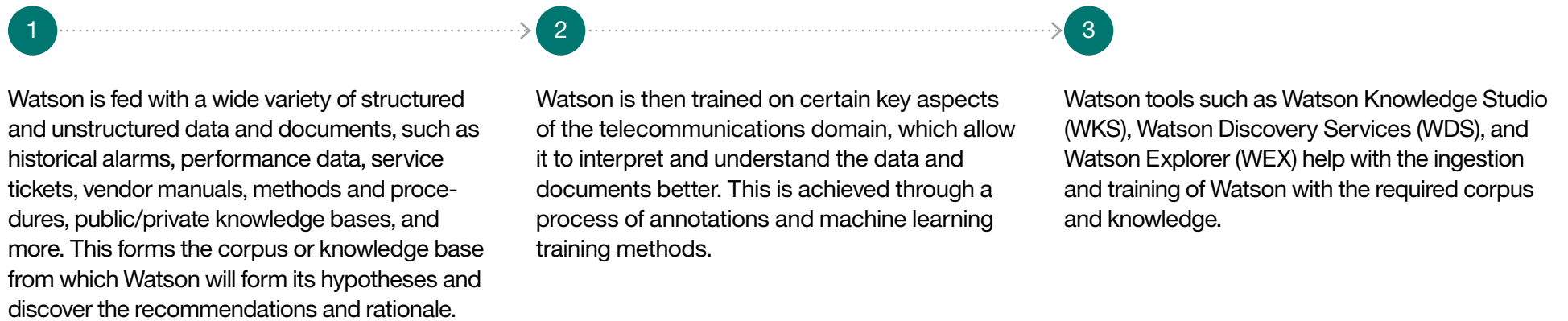
Breaking away with cognitive computing and IBM Watson

With cognitive solutions powered by IBM Watson®, the technician would be able to solve the same challenge described in the traditional NOC scenario as follows:

- 1 When a network alarm or service degradation is detected, Watson analyzes the event and the context and automatically opens a trouble ticket with the right parameters, such as cause code, problem code, and severity.
- 2 Once the ticket is opened, the technician launches the Watson Incident Advisor dashboard and is presented with a 360-degree view of the alarm along with resolution recommendations. This will include:
 - Details of the alarm being solved
 - Performance measures on the component in alarm
 - Related historical trouble tickets for the component (same instance and/or the same component on another device)
 - Recent change requests on the component
 - Recommended resolution(s) with a confidence level for each recommendation
- 3 The technician chooses the resolution that he or she feels is the best fit, and Watson then presents detailed step-by-step instruction on troubleshooting the problem, as available within its corpus/knowledge base. If there are videos in the corpus that match the resolution, Watson provides links to those videos as well.
- 4 If the technician chooses the option to automatically resolve the issues, Watson will launch the appropriate automation script or robot. Conversely, the automation script or robot can also invoke Watson Incident Advisor for advice on certain decisions or for guided resolutions.

How does the IBM solution for cognitive network or service operations work?

IBM offers solutions for cognitive automated NOC or SOC. Watson provides the cognitive advice and continuous learning. To achieve this, Watson is trained to be a network and service technician, which happens as follows:

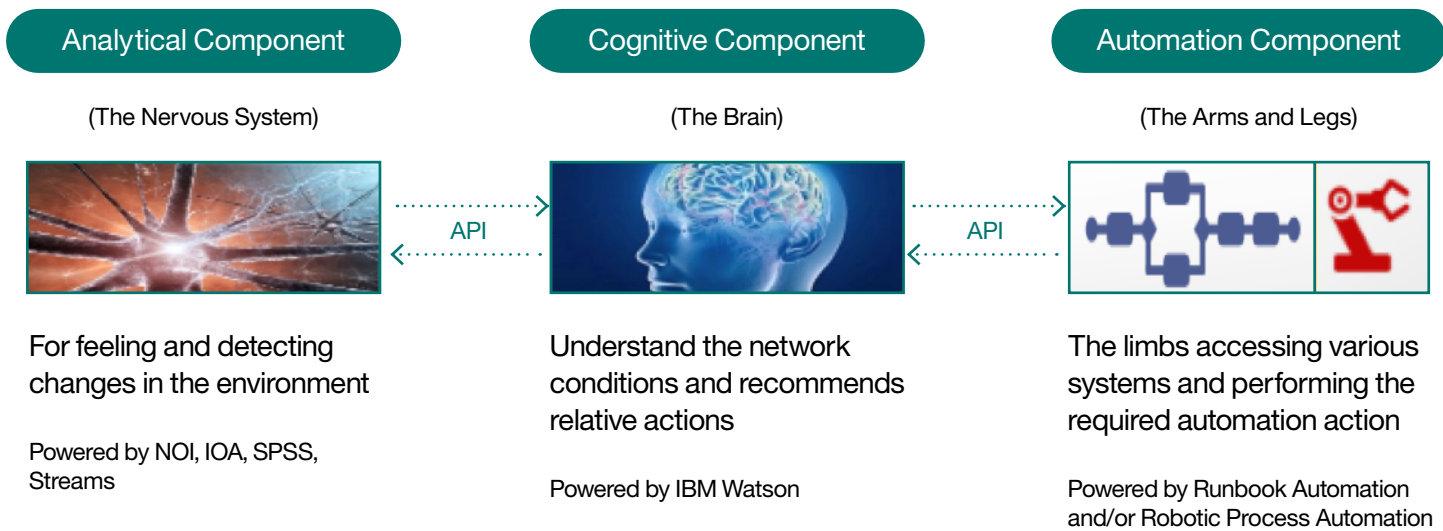


The solution enables technicians to interact in natural language to discover answers to complex technical questions. Watson provides insights and visualization for problem diagnosis and resolution.

Armed with the knowledge and the training in the telecommunications domain, Watson will retrieve the relevant information and present its findings on the dashboard. Because Watson performs semantic analysis, the results are based on the meaning of the search rather than just key words. Based on its retrieval and ranking process, Watson is able to assign a confidence factor to each of the recommendations it makes. It advises on the best solution with a confidence factor, based on the knowledge base and history of similar issues.

How does the IBM solution for cognitive network or service operations work?

The cognitive automated solution stack is comprised of three foundational components: the analytical, the automation and the cognitive. These components are integrated together in a similar way that the brain, nervous system and limbs work together. The IBM solution will seamlessly integrate these components to provide predictive pattern analysis, cognitive learning and knowledge that will inform, shape and drive automation to accelerate the resolution of network operation incidents



How does the IBM solution work?

The key Watson components of the IBM solution for cognitive network or service operations include:

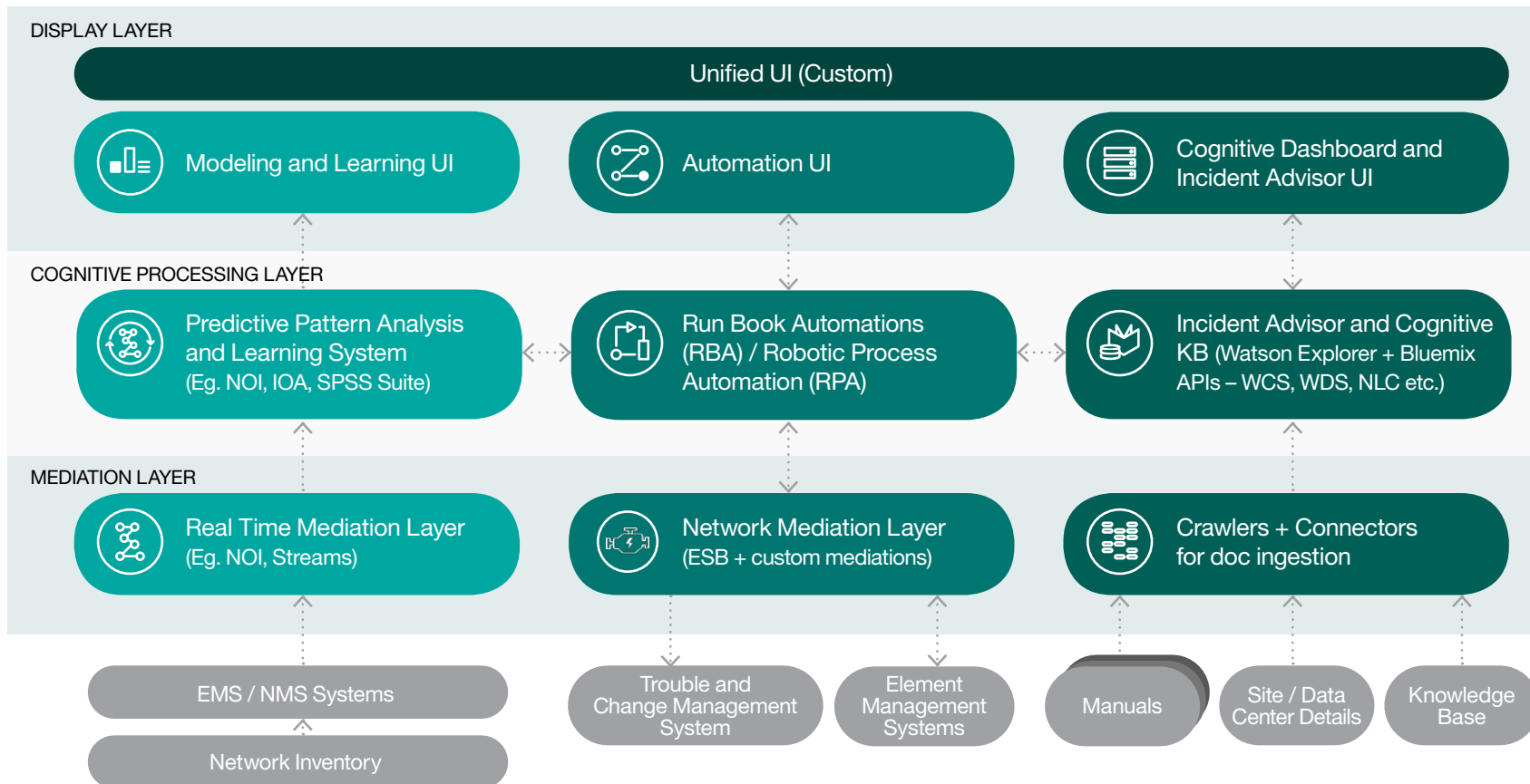
- [Watson Explorer](#), for ingesting varied types of structured and unstructured data sources
- [IBM Bluemix](#)® services, such Natural Language Classifier, Watson Discovery Services, Watson Conversation Services, and Tradeoff analytics or equivalent prioritization API
- [The UI](#), which provides a cognitive dashboard with problem context, best recommended solutions, Q&A, sophisticated search, related concept discovery, optimization, and other functions

The IBM solution for cognitive network operations is built on foundational components, such as: [Netcool](#)® Operations Insight with Agile Service Manager, [IBM Operations Analytics](#) with predictive insights, and/or IBM SPSS®/Streams and automation tools such as Runbook Automation and/or Robotic Process Automation. Together these components provide the capabilities for root cause analysis, alarm pattern analysis, and predictive insights to enable proactive management and automated resolution, as applicable. Watson algorithms are embedded inside these tools to simplify log analysis and define the patterns of performance with seasonality that is constantly changing with network changes to create predictions based on pattern abnormalities.

The solution for cognitive service operations is integrated with Service Quality Management and Customer Experience Management tools for a holistic view of service and customer issues and, based on this complete 360-degree view, provide comprehensive recommendations for problem analysis and resolution.

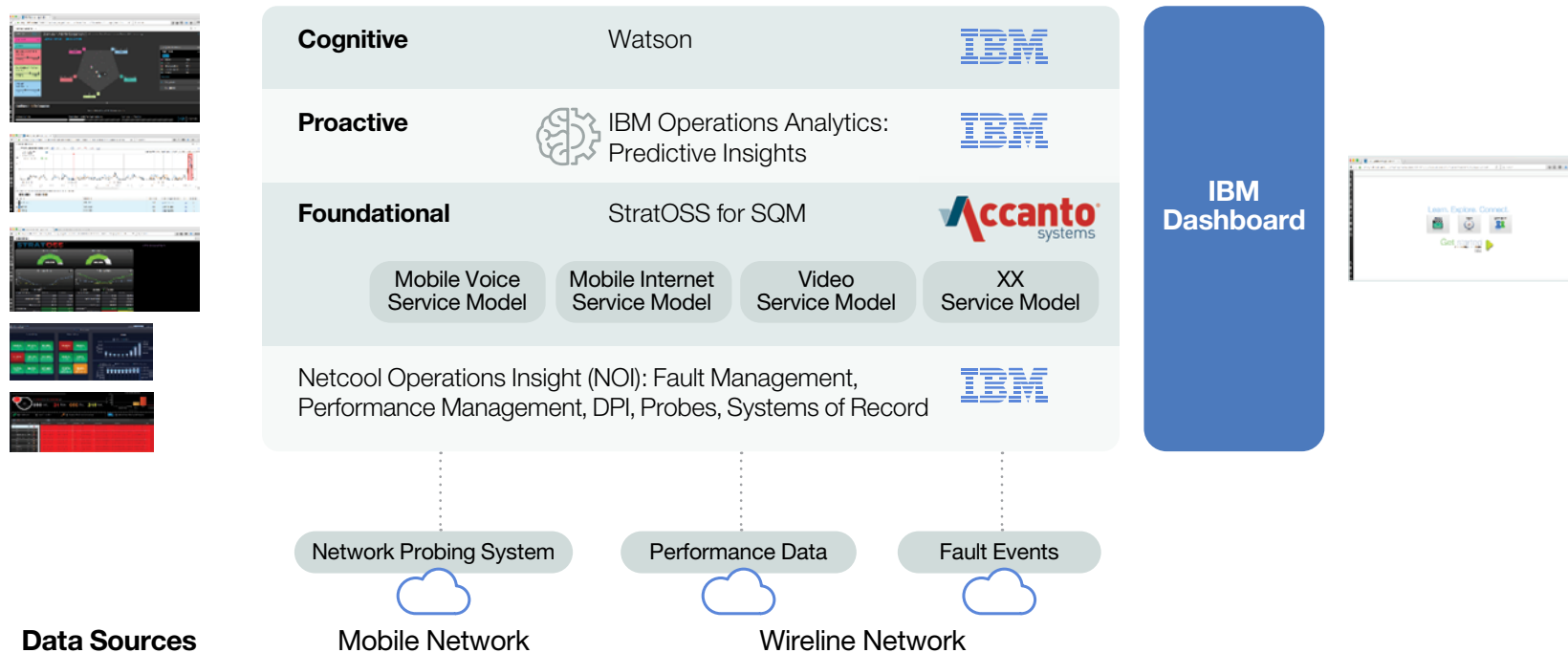
CNOC high level solution architecture (illustrative)

For the cognitive network operations, the analytical components analyze the incoming events and determine patterns that are actionable and automatable. These events trigger an automation for resolution. For those processes that are not fully automated, Watson provides the advice for guided automation. Watson also provides the Cognitive Incident Advisor that the technician can invoke directly to get advice on complex problems. Watson is continuously learning from the technician interaction as well as the effectiveness of the automations.



Cognitive Automated SOC – high level solution

For cognitive service operations, the solution includes an SQM component from IBM Business Partner Accanto Systems called StratOSS™. This component aggregates structured data from various data sources to provide insights into the health of the service. This tool allows the technician to drill down very quickly from the high level service impact to the root cause. The KPIs are also integrated with the IBM Predictive Insights tool to help predict service or network degradation or outage scenarios in advance; this approach helps with proactive management using Watson algorithms to find patterns of performance data with seasonality and then create events when abnormalities occur. Watson Incident Advisor and knowledge base provides the advice needed to efficiently and accurately resolve the issues



Typical use cases supported by the IBM solution for cognitive network or service operations

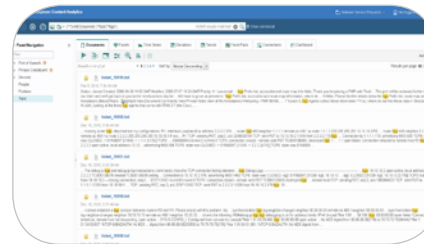
The goal of the IBM solution for cognitive network or service operations is to improve the efficiency of tier 1 and tier 2 technicians within the operations center, through cognitive advice and automation. The cognitive service operations components help facilitate the transition from managing just the network to understanding the service and customer impact to aid in root cause analysis and prioritization.



“ I would like to resolve as many problems as possible versus transferring to higher level support. ”

Josh,
Level 1 Network Engineer

Trouble shooting tools integrated with cognitive functions



“ I need to understand what is happening across my network and services and ensure we are addressing the right issues. ”

Emily,
Overall NOC Engineer

End-to-end dashboard integrated with cognitive functions

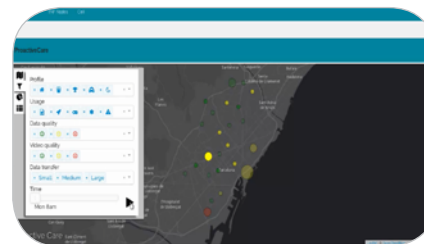


Figure 4: Sample tier 1 and tier 2 personas for the IBM solution

Typical use cases supported by the IBM solution for cognitive network or service operations

The IBM solution does not replace all the tools used by tier 1 and tier 2 organizations, but rather it integrates with and improves the efficiency of those tools.

In the tier 1 organization, Watson can integrate with the trouble ticket tools to help with auto ticket creation, as well as trouble ticket analysis to identify key patterns such as low-complexity, high-frequency tickets that are good candidates for automation, integration with log files to help detect patterns that will allow quicker analysis and resolution of alarms, and more. The solution applies cognitive automation capabilities to significantly reduce the tier 1 workload.

For the tier 2 organization, Watson will integrate with dashboard tools to help the technicians understand the big picture and prioritization of problems, support the development of appropriate automations, and train Watson for continuous improvement.

The IBM solution for cognitive network or service operations supports all aspects of the typical trouble management process, including incident detection, root cause analysis, incident localization, incident resolution, and testing. The solution leverages the corpus / knowledge base for root cause analysis and makes recommendations on the right resolution. With integration to customer-facing and network-facing trouble ticket systems, Watson accurately correlates customer complaints to network tickets by processing the unstructured fields of problem description along with the other structured fields.

Typical use cases supported by the IBM solution for cognitive network or service operations

Key use cases supported by IBM solution:

Predictive prevention and optimization

- IBM's operational analytics and predictive insights tools along with IBM Business Partner products for SQM (Accanto StratOSS), integrate with Watson to help detect anomalies and patterns of degradation before they can cause outages and other critical issues.
- Machine learning capability helps understand normal behavior and establish and maintain dynamic thresholds across IT applications and resources. It detects service impacts that are not identifiable by fixed thresholds alone, while learning and understanding how metrics behave together; helping Identify problems before technicians even know to look for them. Watson also assists with root cause analysis by indicating the most offending metrics.
- IBM Netcool Operations Insight can detect patterns such as seasonality and grouping and recommend actionable insights for proactive alarm management.
- Based on the knowledge base, Watson provides recommendations to proactively optimize metrics for a more stable and efficient network.

Knowledge management and advice with 360-degree Knowledge Portal and Incident Advisor

The knowledge base allows tier 1 and 2 technicians to research answers to complex problems. The cognitive knowledge base supports queries in natural language and in Q&A format. The KB searches for information using semantic analysis, that is, the search is based on the meaning of the search criteria rather than just keyword searches. Watson can retrieve information that is related to the search criteria, even if the key words do not appear verbatim in the results, therefore providing a richer set of insights.

- In the incident advisor scenario, the technician does not engage in exploration, but passes the incident details to Watson and Watson recommends the best resolution based on its training and knowledge base.
- Watson's recommendations are constantly optimized by learning from its interaction with the technician and through the feedback it receives from the technician.

Smart trouble ticket management with historical trouble ticket analysis and insights, integrate smart auto-ticketing and automated resolution

- In this set of use cases, the solution can ingest all historical tickets from a trouble ticketing system and analyze not only the structured data of cause code, problem code, resolution code etc., but also the unstructured data of problem description and resolution notes. In many instances, the structured codes assigned by technicians and the real problem description and resolution do not match, identifies which leads to loss of critical insights. Watson can detect such anomalies and, using the Assists insights from the unstructured data, provide key insights and patterns that help with automation rules.

Business benefits



Reduce
operating cost



Improve
customer satisfaction



Increase
network and service
availability



Reduce
missed SLAs

The IBM solution for cognitive network or service operations can deliver significant returns to organizations, in OPEX savings and improvements in operational efficiencies.

Additional key ROI metrics include:

- Ticket MTTR (Mean Time to Repair)
- First time resolution (reduced rework)
- Reduced ticket escalations/transfers
- SLA compliance
- Network and service availability
- Reduced dispatches
- Reduced NW OPEX
- Increased customer satisfaction
- Improved brand value / NPS
- Reduced NOC engineer training
- Improved operations processes
- Reduced hand-off time from Engineering to Ops, improving time to market

Based on Cognitive Value Assessments (CVA) conducted at various IBM client sites, the following table illustrates the tangible benefits the IBM solution for cognitive Network Operations can yield. However, it is important to recognize that each MSO situation is different and a client-specific CVA will provide the right insights into the business benefits.

Business benefits

Operational efficiencies that drive expenses down:

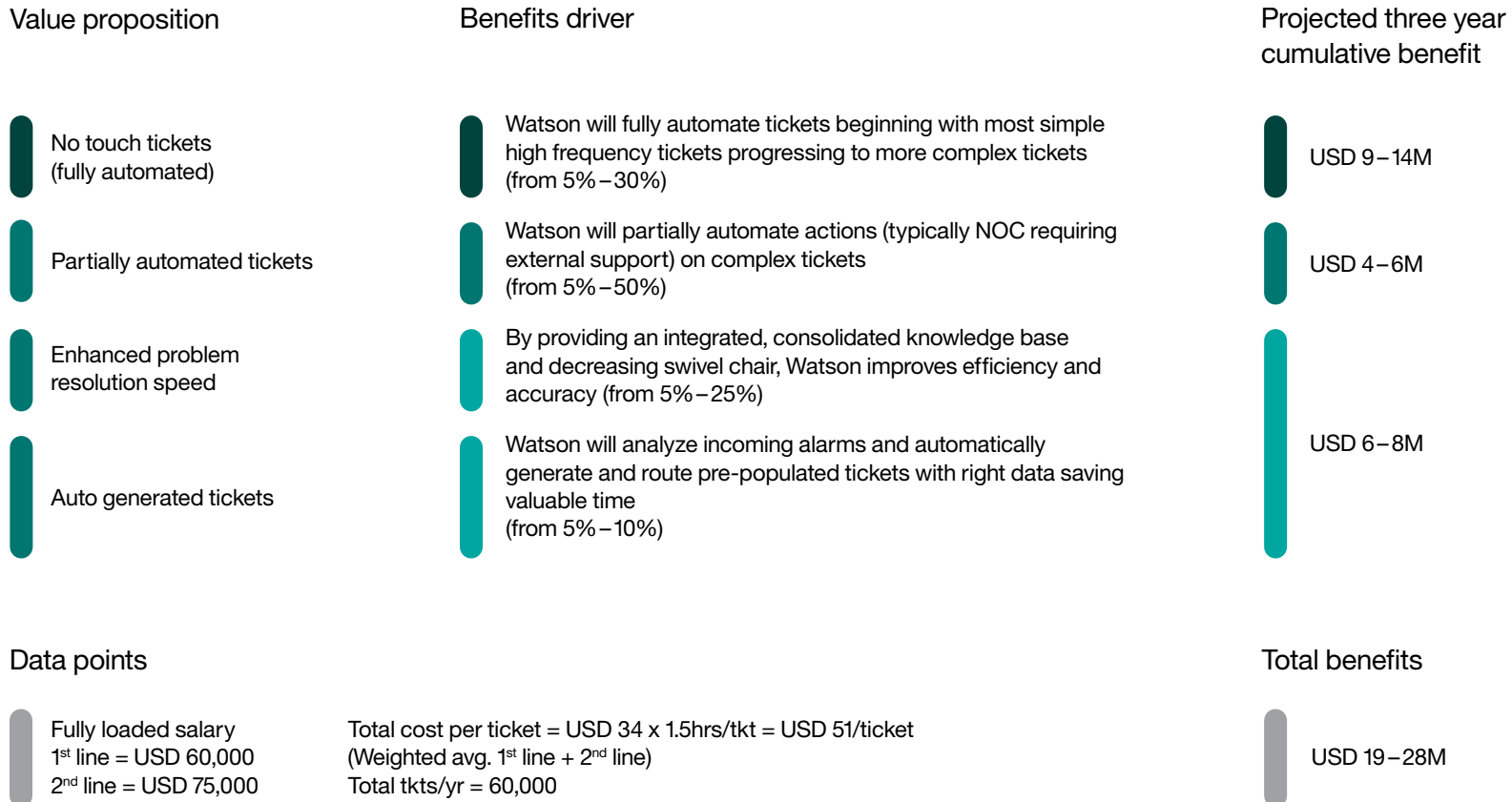


Figure 6: Demonstrated benefits of the IBM Solution

Call to action

Cognitive computing will undoubtedly have a major impact on network and service operations. As organizations embark on network transformation projects, they should consider the following questions:

1

What specific benefit will your network operations gain if it moves into the cognitive era? What will the impact be on operations cost and customer satisfaction if cognitive computing is introduced in your enterprise?

2

Where are you in your journey? Are you in the reactive, predictive, or cognitive phase? How can you most effectively adapt cognitive computing while improving your business objectives?

3

What are the key uses cases you should focus on to deliver short- and long-term value? What are the foundational components you need to implement the initial use cases, and how can future development build on them?

4

What is your organizational expertise and skill gap in cognitive computing? What would change if you could equip every employee to be as effective as the leading expert in that position or field?

5

What communications data aren't you leveraging that if converted to knowledge, would allow you to meet key objectives and business requirements?

6

What benefit would you gain in being able to detect hidden patterns locked away in your data? How would this insight enhance your Network Operations?

IBM can work with you to ensure you maximize the benefits of cognitive computing within your enterprise. To get started, IBM will first conduct a Client Value Assessment to determine where you are in the cognitive network transformation journey. This includes examining your environment to address the above questions, identifying clear business value for the cognitive network transformation and your readiness to proceed, and an outline of a phased approach with clear deliverables. Companies further along in the cognitive journey may choose to work with IBM to improve existing network and service operations by integrating cognitive capabilities, or introduce new cognitive solutions in areas that are especially suited for network and service operations.

For more information

To learn more about the IBM solution for cognitive network or service operations or to arrange a meeting, please contact your IBM Client Representative or the authors of this article for a Cognitive Value Assessment (CVA).

The CVA is an accelerated approach to identify transformational opportunities and associated business value and priority use cases where cognitive computing can be leveraged to enhance network services. A journey map describing vision and transformation enabled by cognitive solutions will be created and a proof of concept to demonstrate Watson's capabilities may be developed.

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Notes and sources

Cognitive computing in the Telecommunication and Media & Entertainment industries

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IBM Watson

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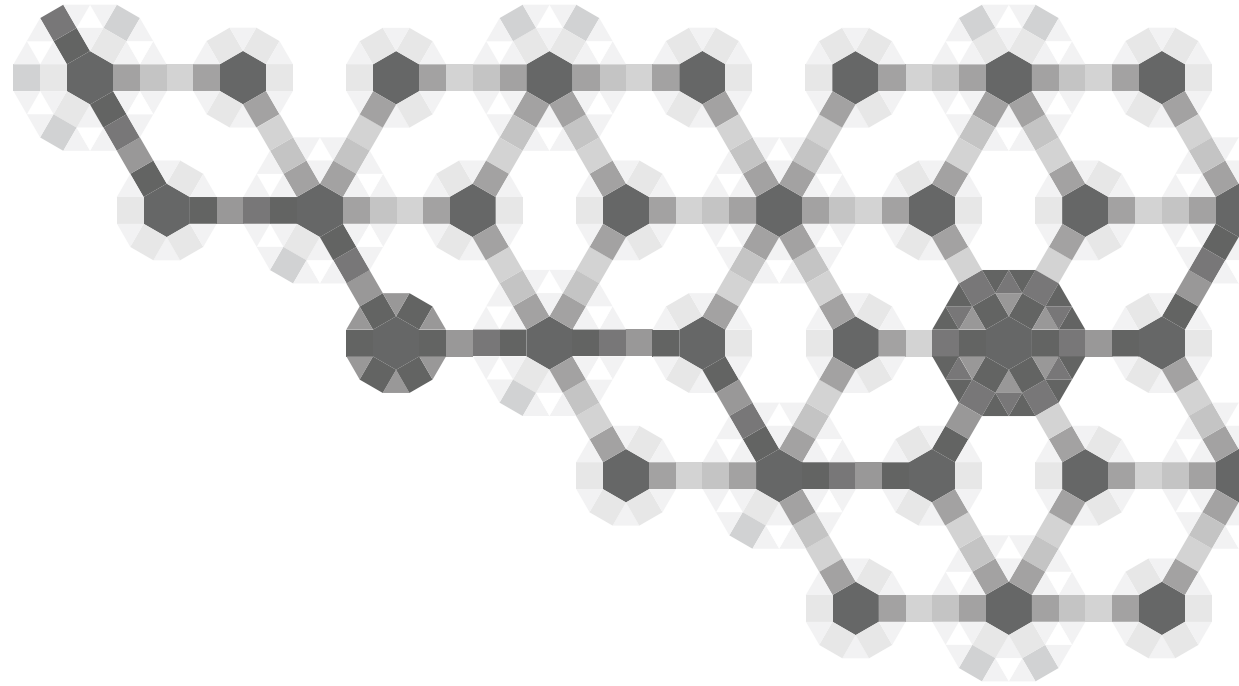
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